

CLAIMS

WHAT IS CLAIMED IS:

1. An adjustable length mold assembly for forming inflatable members

5 having a variety of lengths, comprising:

a first mold piece having a first internal chamber defined at least in part by a first internal molding surface configured to form a first exterior surface of a first section of an inflatable member formed in the mold, and

10 a second mold piece, at least in part slidably disposed within at least a portion of said first mold piece, having a second internal chamber defined at least in part by a second internal molding surface configured to form a second exterior surface of a second section of an inflatable member formed in the mold.

15 2. The adjustable length mold assembly of claim 1, wherein said second mold piece is movable effective to place at least a portion of the second mold piece

in any of a plurality of positions within the first mold piece.

20 3. The adjustable length mold assembly of claim 2, further comprising a

positioner operably connected to said second mold piece effective to move the

second mold piece effective to place at least a portion of the second mold piece in a desired position within the first mold piece.

4. The adjustable length mold assembly of claim 3, wherein the positioner is effective to secure the second mold piece at a desired position.

5. The adjustable length mold assembly of claim 3, wherein the positioner comprises a mechanism selected from the group consisting of a screw, a motor, a solenoid, a hydraulic chamber, a gear, and a sleeve.

10. The adjustable length mold assembly of claim 4, wherein the positioner comprises a mechanism selected from the group consisting of a screw, a sleeve, a stop, a gear, a brake, a pin, a motor capable of maintaining a fixed position, and a clamp.

15. An adjustable length mold assembly for forming balloon portions of inflatable members, said balloon portions having a variety of lengths, comprising:

a first mold piece having a first internal chamber with a first internal molding surface adapted for molding a first section of a balloon portion of an inflatable member; and

20. a second mold piece, at least in part slidably disposed within at least a portion of said first mold piece, having a second internal chamber with a second internal molding surface adapted for molding a second section of a balloon portion of an inflatable member, said second internal molding surface complementing and completing the first internal molding surface.

8. The adjustable length mold assembly of claim 7 wherein the second mold piece is movable effective to place at least a portion of the second mold piece in any of a plurality of positions within the first mold piece effective to provide a variable-length chamber having a length effective for forming an inflatable member
5 with a balloon portion of a desired length.

9. The adjustable length mold assembly of claim 8, further comprising a positioner effective to place at least a portion of the second mold piece in a desired position within the first mold piece.

10. The adjustable length mold assembly of claim 9 wherein the positioner comprises a mechanism selected from the group consisting of a screw, a motor, a solenoid, a hydraulic chamber, a gear, and a sleeve.

15. The adjustable length mold assembly of claim 8, further comprising a locking mechanism effective to secure the position of the second mold piece with respect to the first mold piece.

20. The adjustable length mold assembly of claim 11, where the locking mechanism comprises a device selected from the group consisting of a screw, a sleeve, a stop, a brake, a gear, a pin, a motor capable of maintaining a fixed position, and a clamp.

13. The adjustable length mold assembly of claim 12, where the locking mechanism comprises a screw.

5 14. The adjustable length mold assembly of claim 1, where the first internal chamber has a substantially circular cross-section.

10 15. The adjustable length mold assembly of claim 1, where the first internal chamber has a lobed cross-sectional shape.

16. The adjustable length mold assembly of claim 1 further comprising detachable extension shafts configured to operably connect the first mold piece and the second mold piece to a blow-molding machine.

15 17. The adjustable length mold assembly of claim 7 further comprising detachable extension shafts configured to operably connect the first mold piece and the second mold piece to a blow-molding machine.

20 18. A method of assembling first and second mold pieces to form an adjustable length mold assembly for forming an inflatable member of desired length, comprising:

(a) providing a first mold piece having a first internal chamber with a first internal molding surface adapted to slidably receive a second mold piece; and

(b) providing a second mold piece having a second internal chamber with a second internal molding surface which complements and completes the first internal

5 molding surface to form a variable-length chamber for the inflatable member, at least a portion of said second mold piece having an exterior surface configured to be slidably received by said first internal chamber of the first mold piece along said first length.

10 5 (c) positioning at least a portion of the second mold piece within the first internal chamber of the first mold piece effective to form a variable-length chamber effective for forming an inflatable member of said desired length.

15 10 19. The method of claim 18, wherein the adjustable length mold assembly comprises a locking mechanism, the method further comprising the step of locking the second mold piece into a desired position with respect to the first mold piece.

20 15 20. A method of forming an inflatable member, comprising
(a) providing an adjustable length mold assembly of claim 1,
(b) placing a parison within the variable-length chamber defined by the first and second internal molding surfaces of the first and second mold pieces,
(c) heating the parison to a temperature effective to soften the parison,
(d) raising the internal pressure of the parison effective to expand at least a portion of the parison effective that at least a portion of the parison contacts an inner 20 20 surface of the chamber, thereby forming an inflatable member.

21. The method of claim 20, wherein the parison has a softening temperature and wherein the inflatable member is cooled to a temperature below the softening temperature of the parison.

22. The method of claim 20, wherein the parison comprises a material comprising thermoplastic material, thermoelastic polymeric material, or blends thereof.

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23. The method of claim 20, further comprising the step of locking the second mold piece into a desired position with respect to the first mold piece.

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24. The method of claim 20, further comprising the application of torque to the parison.

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25. The method of claim 20, where the step of heating the parison comprises heating at least part of the mold.

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26. The adjustable length mold assembly of claim 1, wherein said second mold piece comprises a second mold group comprising a second mold piece having an exterior surface configured to be slidably received by the first internal chamber of the first mold piece and a support configured to engage and hold said second mold piece.

27. An adjustable length mold assembly for forming elongated inflatable members, comprising:

a first mold piece having a first internal chamber with a first internal molding surface adapted for molding a working surface of a balloon portion of an inflatable member; and

5 a second mold piece, at least in part slidably disposed within at least a portion of the first mold piece, having a second internal chamber with a second internal molding surface adapted for molding a tapered end section of a balloon portion of an inflatable member.

10 28. The adjustable length mold assembly of claim 27 wherein the second mold piece is secured with respect to the first mold piece to provide an inflatable member having a balloon portion of a desired length.

15 29. The adjustable length mold assembly of claim 27, wherein said second mold piece is movable effective to place at least a portion of the second mold piece in any of a plurality of positions within the first mold piece.

20 30. The adjustable length mold assembly of claim 29, further comprising a positioner operably connected to said second mold piece effective to place at least a portion of the second mold piece in a desired position within the first mold piece.

31. The adjustable length mold assembly of claim 30 wherein the positioner comprises a mechanism selected from the group consisting of a screw, a motor, a solenoid, a hydraulic chamber, a gear, and a sleeve.

32. The adjustable length mold assembly of claim 28, further comprising a locking mechanism effective to secure the position of the second mold piece with respect to the first mold piece.

5 33. The adjustable length mold assembly of claim 32, where the locking mechanism comprises a device selected from the group consisting of a screw, a sleeve, a stop, a brake, a gear, a pin, a motor capable of maintaining a fixed position, and a clamp.

10 34. A method of forming an inflatable member, comprising
(a) providing an adjustable length mold assembly of claim 7,
(b) placing a parison within the variable-length chamber defined by the first
and second internal molding surfaces of the first and second mold pieces,
(c) heating the parison to a temperature effective to soften the parison,
15 (d) raising the internal pressure of the parison effective to expand at least a portion of the parison effective that at least a portion of the parison contacts an inner surface of the chamber, thereby forming an inflatable member.

20 35. A method of forming an inflatable member, comprising
(a) providing an adjustable length mold assembly of claim 29,
(b) placing a parison within the variable-length chamber defined by the first
and second internal molding surfaces of the first and second mold pieces,
(c) heating the parison to a temperature effective to soften the parison,

5 (d) raising the internal pressure of the parison effective to expand at least a portion of the parison effective that at least a portion of the parison contacts an inner surface of the chamber, thereby forming an inflatable member.

10 36. The adjustable length mold assembly of claim 7, wherein said second mold piece comprises a second mold group comprising a second mold piece having an exterior surface configured to be slidably received by the first internal chamber of the first mold piece and a support configured to engage and hold said second mold piece.

15 37. The adjustable length mold assembly of claim 29, wherein said second mold piece comprises a second mold group comprising a second mold piece having an exterior surface configured to be slidably received by the first internal chamber of the first mold piece and a support configured to engage and hold said second mold piece.